Prince George Region

Forest Resources & Practices Team

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Note # PG-04

FOREST

The projected impacts of different biodiversity emphasis options on some forest bird species in the Sub-Boreal Spruce (SBS) zone.

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INTRODUCTION

The distribution of different-aged forest stands on the landscape is one of the most important factors influencing biodiversity in the forests of British Columbia. Consequently, forest age class objectives are an integral component of biodiversity conservation on forest lands. The Forest Practices Code Biodiversity Guidebook presents three options for forest age class objectives depending on whether an area is being managed with a high, intermediate or low emphasis on biodiversity conservation.

The winter wren is a species associated with mature and old growth forests.

Applying the different biodiversity emphasis options will generate different forest age class distributions on the landscape. This in turn, influences wildlife populations. In general, applying the high biodiversity emphasis option should maintain species close to their natural level of abundance, whereas applying the low biodiversity emphasis option will cause significant changes in the abundance of some species.

The purpose of this research note is to indicate the consequences of applying the different biodiversity emphasis options on some forest bird species that live in the SBSmk1 subzone. This will provide more information to help in evaluating the trade-offs between economic considerations and wildlife population requirements.

BACKGROUND

The Biodiversity Guidebook recommends minimum values for the amount of mature and old forest to be maintained in a landscape unit under the high, intermediate and low biodiversity emphasis options. Mature forests in the SBSmk1 biogeoclimatic subzone are defined as older than 100 years and old forests are older than 140 years.

We have collected data on the relative abundance of different forest bird species in different aged stands within the SBSmk1 subzone. That information was used to project the impact of applying the different biodiversity emphasis options on a number on those bird populations.

METHODS

The Biodiversity Guidebook forest age class objectives were used to calculate the proportion of forested area that would be less than 20 years old, 20-100 years old, 100-140 years old, and greater than 140 years old, under the different biodiversity emphasis options when applied to the SBSmk1 subzone. Similar age class proportions were calculated for the natural forest and for a forest managed on a 100 year rotation with no biodiversity guideline requirement to retain mature and old forests.

The natural forest age class distribution was calculated using the estimated frequency of natural stand destroying events such as wildfires. (Appendix 4 of the Biodiversity Guidebook.) In high biodiversity emphasis landscape units, the Guidebook objective is to maintain at least 75% of the amount of mature and old forest that occurred naturally. In intermediate emphasis units the mature and old forest objective is 50% of the natural levels and in low emphasis units the objective is 25% of natural levels.

The objectives for old forests in the Guidebook are calculated by taking the amount of old forest that would occur naturally, reducing that value by 12% to account for areas presumed to be protected under the provincial Protected Area Strategy and then maintaining 75% of that amount in the high biodiversity areas and 50% in the intermediate and low emphasis areas.

Table 1. Forest age class distibution that would result from different biodiversity emphasis options.

	Biodiversity Emphasis Option				
Forest Age	Natural forest	High	Inter-mediate	Low	None**
<20 years (early seral)	15%	13%	15%	18%	20%
20-100 years (young forest)	40%	53%	62%	71%	80%
100-140 years (mature forest)	12%	18%	12%	0%	0%
>140 years (old forest)	33%	16%	11%	11%	0%

** managed on a 100 year rotation with no biodiversity guideline for retaining mature and old forests.

For example, in the SBS mk1 subzone, 33% of a natural forest would be greater that 140 years of age. (see Table 1) Thus, the old forest objective is:

(33%-12%)x75%=16% in the high biodiversity areas, and

(33%-12%)x50%=11% in intermediate and low biodiversity areas.

The Biodiversity Guidebook uses the same old forest objective for both the intermediate and low emphasis options because it was believed that any further reduction in the amount of old forest retention would seriously compromise the objective of maintaining biodiversity.

The proportion of forest less than 20 years of age was assumed to be 20% of the forested area less than 100 years of age under the different management options. Although the actual proportion of area less than 20 years of age may be greater or less than 20% at a given time, when averaged over the entire rotation period it would be 20%.

Data on the relative abundance of different forest bird species in different ages of SBSmk1 forest were based on breeding bird censuses in 1993 and 1994. Birds were counted at census points located in different aged stands during the breeding season. There were 30 to 50 census points in each age class and each point was censused 4 times during May and June.

The relative abundance of each bird species (mean number of detections/census point) within each forest age class was multiplied by the proportion of that age class present within a landscape unit under the different management scenarios (Table 1). Those values were added together for an overall abundance estimate for each management option. The abundance of each bird species under the different options was then divided by their abundance in the natural forest scenario, to determine their abundance relative to the natural forest condition.

For example, the Hermit Thrush would be 1.24 times more abundant in landscape units managed under the intermediate biodiversity emphasis option than in the natural forest.

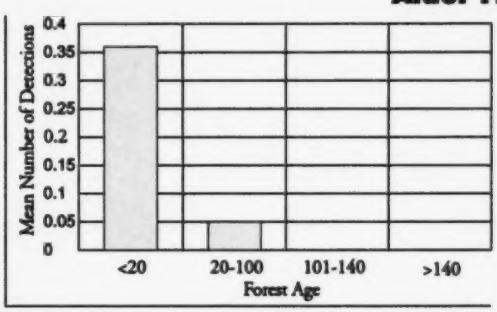
$$\frac{\text{Relative abundance of Hermit Thrust under Intermediate Option}}{\text{Relative abundance of Hermit Thrust under Natural Forest option}} = \frac{0.58}{0.47} = 1.24$$

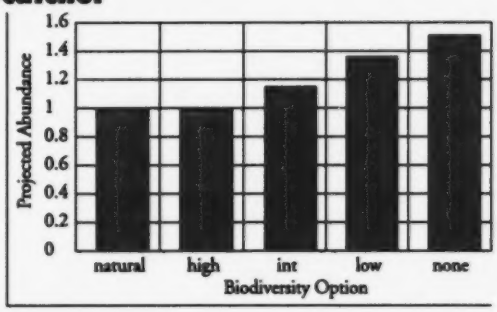
Data for woodpecker species (sapsuckers, hairy woodpeckers, pileated woodpeckers, black-backed woodpeckers, three-toed woodpeckers) were lumped together because detection rates were too low to analyse each species separately.

Bird species associated with young forests.

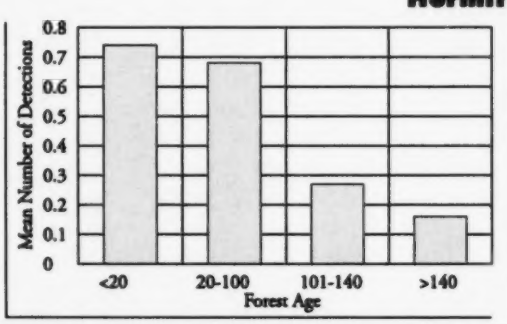
The projections indicate that species associated with clearcuts and young forest, such as the alder flycatcher and hermit thrush would increase in abundance under the less restrictive guidelines because those scenarios provide more young forest habitat.

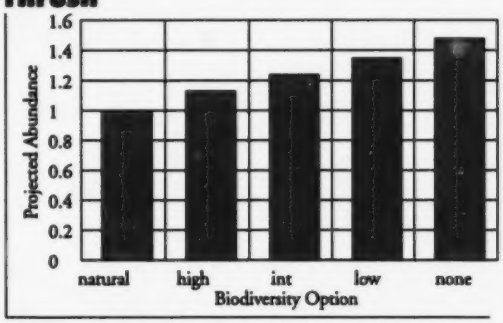
Alder Flycatcher





Hermit Thrush





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RESULTS AND DISCUSSION

The figures show the relative abundance of several forest bird species in different forest age classes, and their projected abundance under different biodiversity emphasis options.

For most bird species, as the biodiversity emphasis option went from high, to intermediate, to low, the projected abundance of the birds became increasingly different from their abundance in natural forests. The greatest differences occurred under the scenario of no mature forest retention. Some species became more abundant as the landscape unit diverged from the natural age class distribution, while others experienced major declines.

In reality, the impacts on mature forest bird species may be even more severe than these projections suggest. The bird data was collected in an area that contained a mix of forest age classes. The low density populations in young forests may not be viable if there were no mature and old forests in the landscape unit to supplement their populations. Also, these projections assume that the younger stands contain wildlife tree patches as recommended in the Biodiversity Guidebook. The data on bird abundance used in these projections were collected in fire-origin stands that contained natural patches of mature forest. If young stands did not contain mature forest patches, the abundance of mature forest bird species in those stands would probably be lower, and these projections would overestimate the contribution of younger stands in providing habitat for those species.

SUMMARY

1. Projections of forest bird abundance under different biodiversity emphasis options indicated that going from the high, to the intermediate, to the low emphasis option resulted in a progressively greater change from the natural abundance of forest bird species.

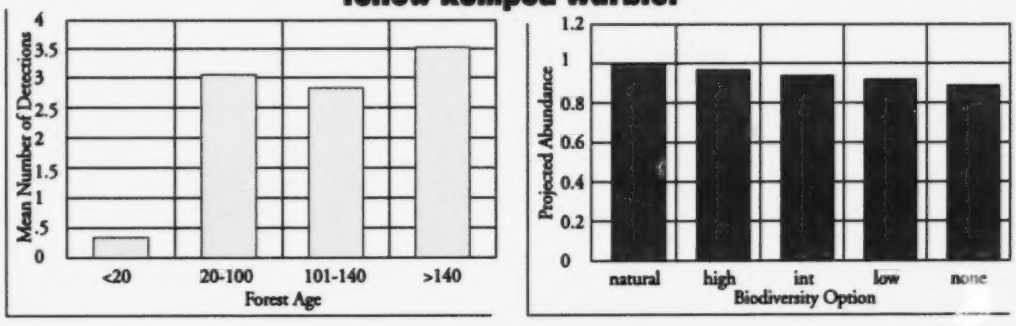
2. Even the low emphasis option maintained populations closer to natural levels than did a 100 year rotation scenario with no mature forest retention.

3. As management options became less restrictive, some species increased, some remained essentially the same, but species associated with old and mature forests exhibited major population declines.

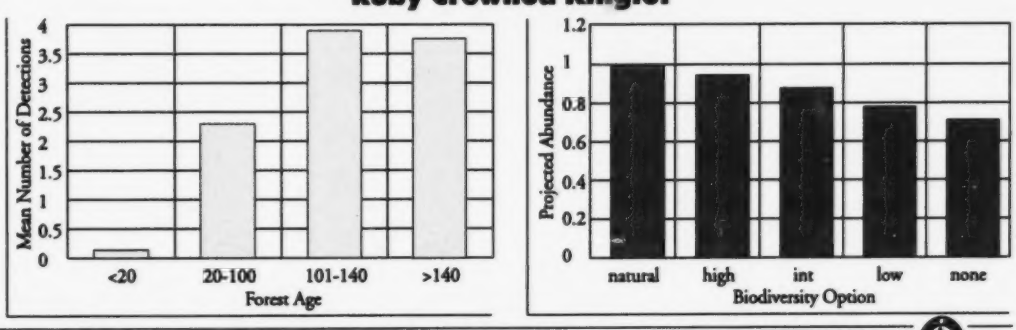
Bird species that are abundant in young and mature forests.

Projections indicate that species that are abundant in both young and old forests, such as the yellow-rumped warbler and the ruby-crowned kinglet would maintain similar abundance or exhibit only modest declines under the less restrictive guidelines.

Yellow Rumped Warbler



Ruby Crowned Kinglet



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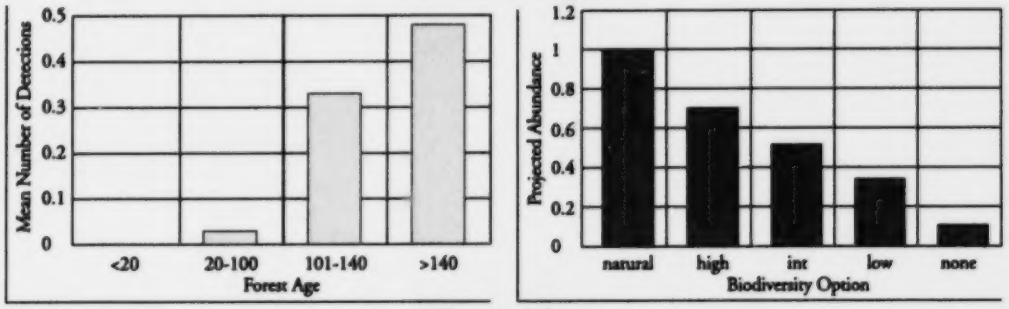
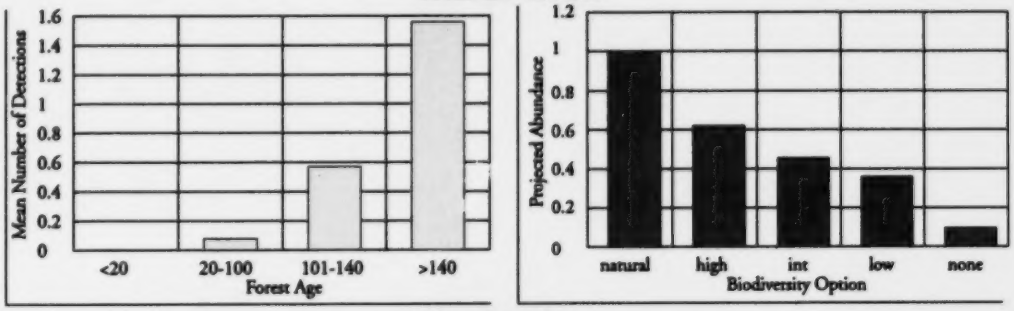
Bird species associated with mature and old growth forests.

The major projected impact of the less restrictive biodiversity options was on species that are strongly associated with old and mature forests. Brown Creepers were reduced to 35% of natural abundance under the low emphasis biodiversity option, and to 11% of natural abundance when there was no mature forest retention. Winter wrens were reduced to 37% of natural abundance under the low emphasis option and to 10% of natural abundance when there was no mature forest retention. Woodpeckers and Red-breasted Nuthatches also progressively declined as biodiversity restrictions were relaxed.

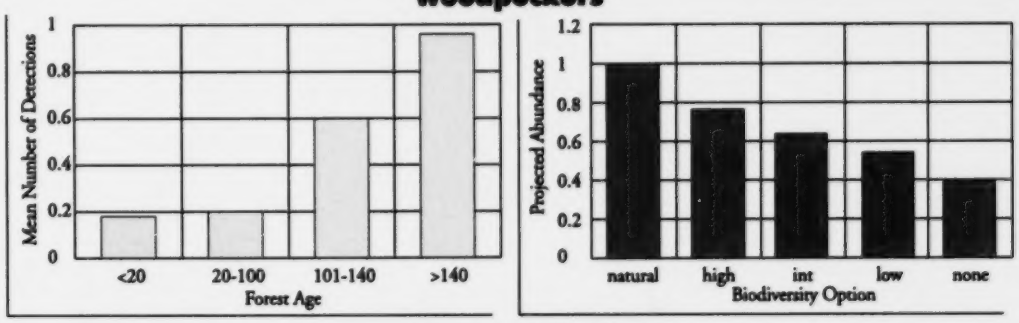
Brown Creeper



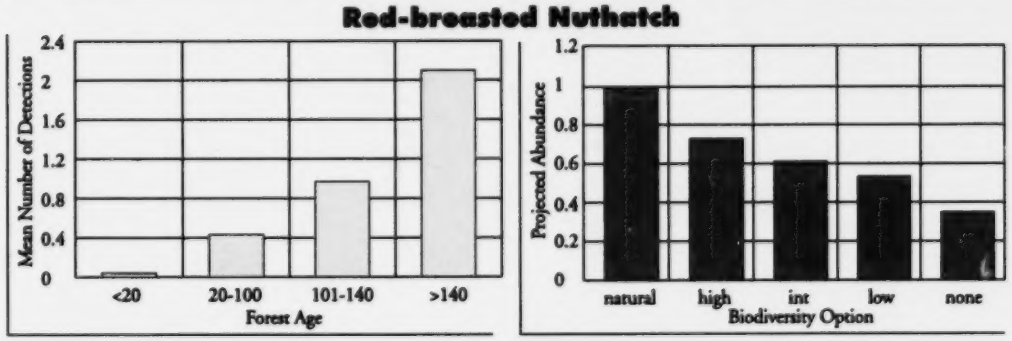
Winter Wren



Woodpeckers



Red-breasted Nuthatch



REFERENCES

The Biodiversity Guidebook, Forest Practices Code of British Columbia, Province of British Columbia, September 1995.

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